ORANGE CULTURE IN SOUTHERN CALIFORNIA

"From Seed to Consumer"

ISSUED BY THE
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Superiority of the California Orange

Unstinted Praise from Opponents.

"The California fruit is gradually taking the market, and will eventually take it all." This startling and sweeping statement was made by Francis E. Hamilton, appearing in the interest of citrus fruit *importers* at the Tariff Hearings, November 18, 1908, before the Ways and Means Committee of the House of Representatives.

Mr. J. C. Chase of Jacksonville, Florida, speaking at the same hearings of the advantages enjoyed by California, and of the greater need of Florida for protection for her citrus fruit, said, "California can ship oranges *every day in the year.*"

Certainty of Crop.

Mr. E. P. Porcher of Jacksonville and Coco, Florida, who appeared upon behalf of the Jacksonville Chamber of Commerce, referred to the superior richness of the California soil, the better climatic conditions, the security from drought and freedom from cold, all insuring a *certainty* of crop. (See page 45, Tariff Hearings before the Ways and Means Committee of the House of Representatives, Nov. 18, 1908.)

What is Left for the Boosters to Say?

Any one who will take the trouble to read these hearings on the citrus fruit industry before the Ways and Means Committee will be amazed at the many unsought tributes paid the California fruit by opponents in business. Boosters for California could not say more.

Credit to Whom Credit is Due.

There is no intention to enter here into a discussion of the merits of the tariff, or its bearing upon the citrus fruit industry, but before leaving the hearings, one quotation from Mr. Champ Clark, a member of the Committee on Ways and Means: "God Almighty has done a great deal for your state, and the more protection you have the more you want." To this Mr. Woodward of San Francisco made rejoinder, "God Almighty, as you say, has done a great deal for California. At the same time the citizens have done a great deal."

Climate and Soil Plus Brains and Brawn.

It has taken brains and hard work, as well as climate and soil, to produce the California orange of commerce. In a way it may almost be classed as a manufactured product. The *certainty* of crop testified to by Mr. Porcher of Florida, has been made possible by an elaborate system of irrigation, and by the use of natural and artificial fertilizers. No rain descending from above has ever been graduated so to facilitate the growth of a fruit as has the application

of water by irrigating ditches. Through the returning of its elements to the soil by fertilization, in addition to the splendid irrigation systems, a continuous succession of heavy crops may be assured.

Southern California, the modern Garden of Eden, minus the serpent and blossoming as the rose, was once thought arid and useless desert,—was, in fact, part of what was known as the Great American Desert. The transformation has not been wrought through a miracle, but by the thought and hard work of California citizens. They have experimented with localities, brought water upon dry land, studied the soil that they might enrich it, worked and watched and waited and prayed,—possibly some of them have cursed; and now that their sheaves, i. e., their full orange crops, are in, their success is attributed to God Almighty. It is due to Him, but in a different way from that intended by Mr. Clark, for God created not only the California country and climate, but the California citizen.

A Sweet Morsel for Californians.

"The California fruit is gradually taking the market, and will eventually take it all." This statement is worthy of study. It may well be rolled under the California tongue as a sweet morsel. It means that just as soon as California produces *enough* fruit to supply all demands, none other will have a show. It is an application of the law of the survival of the fittest, a new reading of "To him that hath shall be given."

Spiritual Seed and Material.

A brief glance at the history of the orange in California will not come amiss here. In 1769 the Franciscan fathers started north from Lower California, and entering what is now the State of California, established twenty-one missions under the direction of Father Junipero Serra. Their avowed object was the harvest of savage souls that might be brought to Christianity; but in the sowing of this spiritual seed they did not forget their physical comfort, nor forego the sowing of the material seed that would in time bring fruit to satisfy the craving of their palates. Eighteen of the twenty-one missions boasted gardens and orchards, and to these fruit-loving pioneer fathers of the Catholic Church may be attributed the discovery of the peculiar fitness of the California soil and climate for the beautiful golden ball which brings wealth to its producers and health to its consumers.

From Small Beginnings.

LouisVignes and Manuel Requena planted small groves at Los Angeles for home use in the year 1834. In 1841 William Wolfskill set out two acres to oranges as a business venture, and it is thought this was the first orchard in the state planted with a view to commercial profit. There are records of meagre and scattered plantings from this time on. The records state that in 1862 there were only 25,000 trees in the entire state. The completion of the Southern Pacific Railroad in 1873 greatly facilitated the profitable marketing of the fruit outside of California and spurred her citizens to fresh plantings.

The stories of the introduction of the Washington navel orange into California by Mrs. Luther C. Tibbetts, of the Valencia by Mr.

Chapman of San Gabriel, of the Mandarin by Dr. S. R. Magee, and of other varieties by various pioneers and promoters, may all be found in the voluminous Government Reports, and have been so often retold that they are omitted from this bulletin.

Oranges a Golden Crop. Orange culture in California is already the most productive branch of horticultural industry in any state in the country. The annual shipments amount to 30,000 carloads, or between 10,000,000 and 12,000,000 boxes, with an estimated value of $20,000,000, less packing charges. In addition to this $20,000,000 to the growers and packers, the crop pays over $13,000,000 for transportation and refrigeration.

Associations have been formed to protect and advance the interests of the growers of Southern California by co-operation, to exchange information on fruit culture obtained through experiment and experience, and to extend the advice of pioneer fruit growers to those planning to engage in horticultural pursuits in Southern California.

Uncle Sam Chips In. The growers have not been unaided in making experiments. Considerable sums have been spent in scientific investigations by the Department of Agriculture, through its Bureau of Plant Industry, for the furtherance of the tremendous interests invested in orange culture; and these investigations have been made particularly with reference to economy in gathering, packing and shipping; that is, the handling of the fruit with a view to a minimum percentage of decay while in transit and upon the market.

Sources of Information. Information gleaned from the above mentioned associations, from reports of governmental experiments, and from other available sources and publications, has gone toward making up this little bulletin on orange culture sent forth by the Los Angeles Chamber of Commerce. Any one wishing to investigate further the subject of orange culture will do well to consult the following documents:

"The Citrus in California," by B. M. LeLong, revised by the State Board of Horticulture, 1902; Fourth Edition of "California Fruits and How to Grow Them," by Edward J. Wickson, A. M., published by Kruckeberg Press, Los Angeles, 1909; "The Decay of Oranges while in Transit from California," by G. Harold Powell, Pomologist in Charge of Fruit Transportation and Storage Investigations, issued by the United States Department of Agriculture as Bulletin 123 of the Bureau of Plant Industry; the "Year Books" of the Department of Agriculture; University of California Bulletin 138; Bulletins 122 and 152 and Circular 11, all to be had free upon application to the Agricultural Experiment Station at Berkeley, California; Tariff Hearings before the Ways and Means Committee of the House of Representatives, Sixtieth Congress, Wednesday, November 18, 1908; Brief of Facts concerning Citrus Tariff Presented to the Ways and Means Committee by a Committee representing the Citrus Protective League of California.

COST OF LAND AND BRINGING IT INTO BEARING.

Land Suitable for Orange Culture. There should be a reasonable certainty that the land is not visited by winds and frost; and, just as a southern exposure is preferable for a house, so it is for an orange grove, but it is far from essential. Lands backed on the north by high hills and mountains are especially desirable. Many orange growing communities have been established on such lands; but as these localities have come very largely into demand for residential purposes, the bare land commands a very pretty price. For a radius of thirty miles or more about Los Angeles the country is covered with a network of electric railways, and its consequent accessibility has appreciably raised its value. However, suitable land for orange culture can still be secured in rural communities in Southern California for from $200 to $500 per acre, depending upon locality and soil. Soil favorable for orange growing varies from a light disintegrated granite to a heavy, dark loam. The subsoil is as important as the surface. Hardpan should be avoided, or strata of sand and gravel.

Water for Irrigation an Essential. A buyer should take great care to see that there is attached to the land a water supply sufficient for irrigation when the grove he intends planting shall have come into full bearing. That such a supply exists and that its use shall be secured to him for years to come should be a matter of searching inquiry before purchase of land for orange growing. He should have from one miner's inch of water to ten acres to one inch to four acres, according to the nature of the soil. Inquiry in the neighborhood where he thinks of buying will advise him how much water is required for the soil in that particular locality.

Windbreaks. Lands visited by winds may in other respects be desirable for orange culture. In such case, it is customary to plant windbreaks on the windward side of each five or ten acres. These windbreaks usually consist of alternate eucalyptus and pepper trees, planted ten or twelve feet apart. The pepper is a dense, low-growing tree, while the eucalyptus is tall and slender. The combination makes a high, solid wall, capable of offering great resistance to the wind. Both are rapid-growing trees. The Monterey cypress also is used for windbreaks. These trees should be planted from six to eight feet apart. Ample space should be allowed on each side of windbreaks. If placed too near the fruit trees they rob the latter of sustenance.

Cost of Development. After the purchase price of the land comes the outlay for developing a grove. By ten years a grove should be in full bearing; but from the fourth year there will be some returns, and by the sixth year the returns should offset, or more than offset, the yearly outlay. The cost of irrigation and cultivation will vary according to local conditions, such as soil, climate, water supply and lay of land, from $15 to $25 per annum for irrigation, and from $15 to $20 per annum for cultivation. Where the labor is performed by the owner or mem-

bers of his family the expenditure is materially reduced. Assuming, however, that the owner hires the labor, and placing the cost of the land arbitrarily at $250 per acre as a basis for the estimates, below is computed the maximum and minimum cost per acre of an orange grove at the end of six years. These figures do not include interest on investment and taxes. The tax rates vary so in different counties and different school districts that it is impossible to give any definite figures.

Maximum.		Minimum.	
Land, per acre	$250	Land, per acre	$250
Prep., plants and planting	150	Prep., plants and planting	125
Six years irrigation	150	Six years irrigation	90
Six years cultivation	120	Six years cultivation	90
	$670		$555

From the sixth year on there is generally a cost for fertilizers. Say that fertilization from the sixth to the tenth year amounts to from $150 to $175, the grove will have cost at the end of ten years, when it should be in full bearing, from $825 to $1025 per acre, as shown by the following table:

Maximum.		Minimum.	
Land, per acre	$250	Land, per acre	$250
Prep., plants and planting	150	Prep., plants and planting	125
Ten years irrigation	250	Ten years irrigation	150
Ten years cultivation	200	Ten years cultivation	150
Four years fertilization	175	Four years fertilization	150
	$1025		$825

As before said, there is considerable reduction in the expense where the owner or members of his family perform the labor.

The Returns. It must be remembered in looking at the second set of figures that for four years or more the crop will have been paying a more or less handsome return on the investment. The net returns to the average grower from a grove in full maturity should be from $100 to $500 per acre per annum, according to variety of fruit, locality, market conditions and care given. Good managers often get much larger returns. One firm of independent packers inform the Chamber of Commerce that they paid this winter $14,000 on the trees for the crop of a fifteen acre grove, and $5000 on the trees for the crop of a five acre grove. Their profit on the latter was $2,200, less expenses. This sounds good, but does not equal those golden bonanza days in the orange industry when $2000 could be taken from a single acre within the course of one year.

PREPARATION FOR PLANTING, STOCK AND PLANTING.

Getting the Ground Ready. Before the planting, preferably in the spring, the land should be thoroughly worked. All weeds and tubble should be plowed under: they will add to the fertility of the soil. But first the land should be surveyed and graded, so that water can be carried to each tree.

Where the land has not been first properly graded, the owner finds later to his sorrow that it is impossible to water properly all trees in the grove. After the grading the land should be plowed at least twelve inches deep. The land should then be settled by rains or irrigation, and plowed again, deeper, if possible, than the first plowing. The soil should be thoroughly pulverized by harrowing.

The Nurseryman is Worthy of His Gain.

It is neither wise nor expedient for a new grower to try to propagate his own stock, as any saving he may effect will be vastly offset by time wasted and interest on investment. He should endeavor to secure trees that are true to name, of vigorous constitution, and so grown as to produce maximum crops when they arrive at the bearing age. The veteran advice of practiced growers may well be sought when buying citrus stock. It does not pay to economize in buying young trees. Only clean, healthy, well-grown trees should be accepted. Scrubby, ill-grown, neglected trees are dear even as a gift, and will never repay the care and outlay required in their culture.

The following pertinent advice with regard to the buying and planting of nursery stock is contained in an essay read before the Escondido Farmers' Institute by B. F. Dixon:

"We know that it is possible to pack trees so that they may be shipped long distances, and, when planted, nearly all live, but from observations of the experiences of various planters we have concluded that the only safe plan is to buy your trees from the nearest nursery and superintend the digging of them yourself. After your trees are planted in orchard form they should be watered and thoroughly cultivated every thirty days during the dry season. In the rainy season cultivate enough to keep down the weeds."

Time for Planting and Arrangement.

The orange being an evergreen, may be transplanted at any time, but from April to June is the best season, when the ground is warm and the tree is at its period of greatest strength and root power. The orange is supersensitive to exposure of its roots, and for this reason the handling of young trees is different from that of ordinary orchard trees. Exposure of the roots or careless planting will doom the tree to slow, sickly growth, or kill it outright.

That the trees may be placed in straight rows and the orchard present a tidy appearance, as well as to give each tree its fair show, the ground should be laid off carefully by the square, quincunx, or hexagonal methods. (See "The Citrus in California.")

Methods of Transplanting.

There are two principal methods by which your tree may be transplanted from its nursery to its permanent home, your orchard. First, there is the balling system. A narrow trench is made along a row of nursery trees at a distance of about six inches. The tap root is cut about eighteen inches deep; then, with a sharp spade, the earth is cut out, leaving in it the tree. The leaves of trees taken up by this process will hardly wilt.

Second, there is the puddling system. Where the soil is so loose that balling is impossible, a hole is dug around the nursery tree and filled with water. This soon loosens the roots and the tree is lifted out without difficulty. Many prefer this system, as it is less expensive, and gives the trees larger and more roots.

Topping the Tree and Extending its Roots. Many planters hold that trees taken from the nursery should be topped, and the branches so cut that in starting they will form a fine-shaped head. This, they say, prevents the evaporation that takes place so rapidly when the leaves are allowed to remain on the young trees. When the roots have taken a firm hold in the new soil and resumed their natural functions, they can take care of the new leaves that put forth.

A common and harmful practice in planting trees with loose roots is to place the tree in the hole, fill the hole with soil and water, and then tramp on it to pack the earth. As the roots are covered with thick mud they will stick together, and though the tree may grow even with this hard usage, it will not do nearly so well as when the roots are *extended* with care. The process is simple. The hole should be half filled with earth, which being loose admits the tap root of the tree by slight pressure of the hand; then the lateral roots are spread and the soil is lightly pressed. Heavy tramping is not necessary, as the water settles the dirt and keeps the roots in place. As soon as the water in the basin has disappeared, the basin is covered with loose soil; this will prevent evaporation and keep the tree from leaning over.

Newly transplanted stock in case of either a cold or hot spell, may be protected by wrapping with old newspapers.

PRUNING, PROPPING AND BUDDING.

Low Pruning is Best. A contest was waged for many years between the advocates of high and low pruning. Victory finally perched on the banners of the low pruners; experience having demonstrated that in the California climate with its long dry period, and in the dry soils in which citrus fruits attain their best condition, low pruning protects the tree from the sun and better retains the moisture in the earth around the root of the tree. The fruit of a low-pruned tree is more easily and cheaply gathered than that of a high-pruned tree.

Clipping and Pruning. Different varieties of oranges, or the same in different localities, are picked in differing seasons, and the proper time for pruning is after the removal of the crop. At all seasons of the year, however, superfluous sprouts on the trunk and stray branches that threaten to throw the tree out of balance should be removed without delay. That the knife should be very sharp is essential and all cuts should be made as smooth as possible. Cuts made with a saw should be pared down smooth with a sharp knife, then waxed over and painted with gum shellac in proper

solution to spread easily. The pruner is a tree surgeon who must tend the wounds he has made.

The young growth should be clipped with the definite idea of developing a close and systematic head. Suitable clipping during the early and rapid stages of growth of sprouts and stray branches should obviate almost entirely the need of pruning.

Propping Overladen Trees. Propping of overladen trees is an essential feature of orchard work. Adjustable props made of wood have taken the place of the old style willow poles. The props are so arranged that the ends rest under the tree and do not interfere with the cultivator, as they did when placed surrounding the tree on the outside.

Improvement by Budding. Stock may be improved by budding. As before said, care should be taken in buying nursery stock that the trees be true to name; but if upon coming into bearing they are not, or do not bear well, they should be cut back and budded over. Many different varieties of oranges may be grafted on one tree. An orange tree may be budded to lemons, or a lemon tree to oranges, according as one crop is more profitable than the other. This is something of a gamble, as it cannot be determined by one year's sales which way the market will go the next.

This bulletin is restricted in length and for directions for budding the reader is referred to "The Culture of the Citrus in California," which contains full information with illustrations.

IRRIGATION, CULTIVATION AND FERTILIZATION.

Orange Raising Partially Artificial. The raising of the orange in California should only be attempted in districts where irrigation is possible. The tree is a native of tropical forests, where it grows in warm soil and obtains abundant moisture; and its successful culture in California, which lacks summer rains and moisture-laden atmosphere, is necessarily in a degree artificial, and may be regarded as a notable triumph of modern horticulture.

How to Cultivate and Irrigate. Cultivation and irrigation are closely related to each other. In order to achieve the best results, water should be applied in sufficient but not excessive amounts; and deep irrigation as well as cultivation will keep the feeding roots as low as possible. The depth of cultivation should vary from year to year; twelve inches, eight inches, ten inches, fourteen inches, eight inches, twelve inches, etc. Such variation in cultivation puts an end to much of the outcry against "hardpan," which frequently is not hardpan at all, but only the well-known "plow-sole," which comes from plowing to the same depth each time, with the added aggravation of shallow irrigation. Experience shows that the best results with irrigation are obtained where water is slowly run in deep furrows, and the greater part of the surface is kept dry and deeply cultivated. With this

method a team can be driven along the dry strips of land between the furrows, and with a harrow or other appliance the dry soil can be dragged into the wet furrows to lessen the evaporation, immediately after the irrigation water is turned off. With any other system, it is necessary to wait twelve hours, or much longer, before a team can be driven over the ground.

The cost of installing a sub-irrigation system places it beyond the reach of the ordinary small grower; but it is the ideal way to apply water, and greatly lessens waste. However, the method outlined above, approaches sub-irrigation more nearly than any other.

Much more benefit can be derived from the same amount of water when it is run three days instead of two, the third day leaving more water in the ground than either of the others.

When and Where Fertilization is Necessary. California soil is known to be naturally rich; and when orange trees are planted on virgin ground, they will usually do well for the first few years without any application of fertilizer. In sections where the soil is shallow it is expedient to apply a fertilizer every year from the time the orchard is planted.

Experience of orange growers proves that the quantity of fruit may be increased, and the quality improved by fertilization. The extent and character of fertilizing is obviously dependent upon local conditions. The new man will observe and follow the practice of the most successful growers in his immediate locality. California soil is rich in all the subsidiary elements necessary for orange culture, and the intelligent grower will see that his trees do not suffer for want of nitrogen, phosphoric acid and potash, the elements which the crop draws annually from the ground, and which must be replaced.

Different Kinds of Fertilizers. The generally accepted way to enrich the soil is to place the best manure, and the most of it that is practicable, upon the orchard with its first fertilization, and piece it out afterwards with such commercial fertilizers as local experience has proven profitable. In many orchards a green fertilizer is planted, cow peas or vetches being considered the best two for a cover crop to be turned under in the spring.

DISEASES.

Victory Won over Disease. The orange in California is subject to but few diseases. Once the industry was threatened by the white cottony cushion scale, and once by the black scale; but both were conquered by science and patience. Every form of insect pest can be successfully eradicated if due care be exercised. The Horticultural Commissioners in each county stand ready to give veteran advice and assistance to new growers in case their trees show signs of disease.

Fumigation and Spraying for Scale Pests. Of the insect pests of the orange, the most to be feared are those which attack the fruit—either its surface or pulp. A common precaution against any possible insect disease in nursery stock is its thorough disinfection with carbon bisulphide, which no insect life can withstand.

The red scale and the purple scale, both brought into California from Florida, and the black scale and the brown scale, have been successfully treated by fumigation with hydrocyanic gas. The treatment is elaborate and requires special apparatus, which is described in Bulletins 122 and 152 and Circular 11, all to be had free upon application to the Agricultural Experiment Station at Berkeley.

These pests are also treated by spraying with a solution of distillate.

Gum Disease. There are various forms of so-called gum diseases. One attacks both old and young trees at the crown and the root, while another appears on the large limbs in the form of a scab, and another on the trunks and main branches. The most deadly of these is the root form, which is apt to break out in almost any locality. This is an exudation of the sap which breaks through the bark of the trunk close to the ground, and congeals in the form of a gum.

How Treated. One successful remedy for this disease is to peel off the bark where the gum oozes and cover the diseased part with a solution of two parts of resin and one part of beeswax, thinned with linseed oil. Another remedy is to crease the bark from the limb to the root with a knife, then paint the entire trunk of the tree with neat's foot oil.

The new grower may not have any of the unpleasant experiences indicated above, but "forewarned is forearmed."

FROST.

Shutting out King Frost. California has not been so subject to frost as some less favored portions of the country, but she has not enjoyed immunity. Repeated severe frosts in a locality demonstrate it to be unfitted to the citrus industry; but some of the best orange-growing sections occasionally get a nip. However, human ingenuity has met the frost king and held him at bay. In sections liable to slight frosts, preventive measures are taken, such as the planting of windbreaks, which keep out frost as well as wind; and the natural protection afforded the fruit by promoting heavy leafing.

In cases of emergency frost is fought and conquered by the use of covers, dry heat, and smudges. The first named method is only practicable in small orchards. For details of frost fighting see "The Citrus in California," pages 155 to 161.

Seldom, even in the worst seasons, will frost extend over more than one or two nights; and a late frost, when the orange is near maturity, harms it but slightly.

The new grower is reminded that in looking out against frost he can seek advice from the Horticultural Commissioners of his county.

GATHERING, PACKING AND SHIPPING.

How to Pick Oranges. In gathering oranges the ripe fruit should first be taken, lightening up the trees. The orange should never be pulled, but clipped, preferably with blunt-pointed clippers. The stem must be cut short, and great care should be exercised that the clipper does not cut the skin.

Cooling of Fruit. Where there is no pre-cooling plant easy of access the fruit should not be packed fresh from the tree, but should cool by lying at least overnight. Many packing plants are equipped with fans for cooling and drying. Under the pre-cooling method fruit is cooled to and kept at a temperature of 36 degrees. Thus far, few packing houses are equipped with pre-cooling plants, and there is talk of the railroads erecting pre-cooling plants to care for the fruit from the smaller exchanges. Pre-cooled fruit requires but one icing between Los Angeles and the extreme east, as against two or three where there has been no pre-cooling. The percentage of decay is reduced to a minimum, and the fruit has a higher market value, as when it is known to be solid and sweet throughout the box it is bound to command better prices.

Machinery and Methods Employed in Packing Houses. The following description of a packing house is taken from "The Decay of Oranges while in Transit from California," by G. Harold Powell: "The average packing house is equipped with box-making machines, which nail together the boxes for carrying the fruit to market; specially constructed hand-trucks for moving several picking or shipping boxes at a time; hoppers for receiving the fruit; washing tanks and scrubbing machines to remove the sooty-mold fungus, and drying racks in those sections where the fruit has to be washed; elevators to carry the fruit to the grading and sizing machines, drying racks and other places; carrying belts or chutes; automatic weighing and recording scales for weighing the different grades of fruit of each grower; series of padded bins, sometimes with self-adjusting bottoms, for receiving the different sizes of fruit; belts to carry the packed boxes; presses for covering the boxes, and sometimes a system of fans to assist in drying the fruit; and a machine to wrap the fruit automatically. All of the stationary machinery is run by power, making the interior of a large packing house in operation resemble the interior of a complex factory.

"There is a wide variation in the type and arrangement of the different kinds of machinery."

Fruit Graded According to Quality, not Size. The grading of fruit has no reference to its size, but depends upon the general texture of skin, on appearance as influenced by scars, and on the general form and style of the fruit. Bright colored, smooth, firm oranges, with thin fine skin, will always command the best price.

The grades of oranges are usually known as "Fancy," "Choice," and "Standard." Weight, juiciness, thin, deep-orange-colored skin

fine in texture, and freedom from blemishes are the requisites for the first grade. A "Choice" orange is supposed to have good color and fairly good texture. It may have a few slight blemishes; but it is supposed to be free from frost damage and reasonably heavy and juicy. A "Standard" orange may be quite badly scarred or discolored, coarse in texture and irregular in form, but should be merchantable shipping stock. There is a fourth grade, "Culls," sold to peddlers, or shipped to nearby markets.

Standard Packs and Boxes for Oranges. A standard box of California oranges is 12 by 12 by 26 inches outside measurement, divided in the middle by a partition, with an inside fruit space of 11½ by 11½ by 24 inches. A box of oranges packed for the market is estimated to average 72 pounds. The number of oranges in a box may vary from 80 to 324, and for the different sizes of oranges there are standard methods of arranging the layers. Packs of 80, 96, and 112 oranges go in four layers; 126, 150, 176, 200 in five layers; 250 and 324 in six layers.

The picking box, which is without partition, holds but fifty pounds, and must not be confused with the packing box.

Prime Importance of Careful Handling. The researches of Mr. Powell and his assistants have demonstrated the importance of careful handling of the crop in picking and packing, as he found most of the decay in transit came from mechanical injuries. Perhaps the clipper has cut the skin, one orange has punctured another, the fruit has been dropped hard and bruised, or punctured by the finger-nail of the picker or by twigs and gravel in the bottom of the picking boxes; or the trouble may have been caused in the packing house by a broken wire in a wash tank, a protruding screw among the bristles of a brushing machine, a nail or bolt extending into a chute or runway, or some similar defect as easily remedied.

Associations Market Major Portion of Crop. The grower generally delivers his crop at the nearest packing house, and from that time on it is handled by the local association, which is generally run on the co-operative plan. These co-operative associations handle from 70 to 75% of the citrus fruit crop. There are also firms and individuals who pack, distribute and sell fruit on commission for the growers. Much of this fruit is sold f. o. b. cars in California, while some is consigned to distant merchants. Some firms also buy the fruit on the trees from the grower, either by the pound or by paying a lump sum for the entire crop.

The California Fruit Growers' Exchange is the largest of the Co-operative organizations, marketing something more than 56% of the entire citrus crop. It represents about 4,000 growers who are organized into more than 80 local incorporated associations.

For details of the working of exchanges, the handling of fruit in the packing houses, methods of refrigeration, etc., the reader is referred to Mr. Powell's book, the number of which is given above.

PERIODS OF SHIPMENT.

Every Day in the Year.

"California can ship oranges every day in the year." Mr. J. C. Chase of Jacksonville, Florida. "In fact, California can keep the market supplied with oranges fresh from the tree and in prime condition the year around." Edward J. Wickson, in "California Fruits, and How to Grow Them."

There is no time in the year when there are not some shipments of oranges from California, and the period of ripening of the different varieties should be made a matter of close study by the person intending to set out a new orange grove, for there are certain times in the year when the California orange has no competition whatever, and consequently brings a fancy price.

Shipments Heaviest after Christmas.

At present, the lightest shipping months are September and October. Some of the crop is picked early and shipped east for the Thanksgiving trade, and the large Christmas demand is also supplied. In January the heaviest shipments begin, consisting mainly of the navel orange. Shipments of navels continue until June. The late Valencia and Joppa oranges are shipped in July and August. Some growers of Valencias hold their crops on the trees even longer, marketing them as late as November.

VARIETIES OF FRUIT.

The most profitable varieties of oranges grown in California are the following, and their relative importance is about according to the order in which they are named:

Variety most Commonly Planted.

Washington Navels. The fruit is of a flaming golden color; is solid, heavy and seedless; smooth of skin and fine of texture; pulp melting, very juicy and highly flavored. It begins to ripen in November. The tree is semi-dwarf, a rapid grower, and a prolific and early bearer. Its foliage is deep green, heavy and compact, with leaf large and prominently winged. It is sturdy stock, with limbs well balanced, smooth and deep green branches, and is thornless. The blossom contains a secondary blossom within itself. The tree was imported from Bahia, Brazil.

Profit in Valencias.

Late Valencia. This orange has proven one of the most, if not the most profitable. It ripens in May and June, when the other varieties are out of the market, and can be held on the trees as late as November and still be in fine shipping condition. The fruit is elliptical, large and very heavy, contains very few or no seeds, is remarkably juicy and fine in flavor, and in contrast with its pale yellow or greenish skin is the deepest orange within. It is an excellent shipper. The tree, which is large and prolific, was imported from England.

A Heavy Bearer.

Mediterranean Sweet. Fruit of medium size to large, pulp and skin of exceedingly fine texture, has few seeds, is deep orange color, and ripens late. The tree, which is thornless, of a dwarf habit and a heavy bearer, was brought from the Mediterranean region.

A Dash of Red. Malta Blood. Fruit medium size, oval shape, textur and flavor very fine, pulp marked vinus with red; cor tains very few seeds. The fruit often shows touche of red on the skin also. The tree is dwarf and thornless, and wa imported from the Mediterranean region.

An Island Variety. Paper Rind St. Michael. Fruit small, round, firm an juicy, with a pale, thin skin. It grows very uniforn in size, ripens late and keeps well on the tree; is a rapi grower and prolific bearer. The tree is large and was imported fron the Azores.

Aromatic and Delicious. Tangerine or Kid Glove. Fruit deep red, smal very sweet and aromatic, and when ripe the rin is very easily detached. The tree is dwarf, un form in shape, and of a weeping habit.

For Gardens. Satsuma. Fruit small, flattened, of exceedingly fin texture, sweet and seedless, rind very easily de tached. The tree is dwarf and very hardy. It is best suited for gar dens.

Edible Whole. Kumquot, or Japanese Orange. Fruit is edibl whole (rind and all), is very small and elongate in shape, with rind thick, yellow, smooth, sweet and scented. Th fruit has very little pulp and contains many seeds. The tree is dwarf, little more than a bush, and like the Satsuma, is best suite for gardens or home plots.

A WORD OF WARNING.

In closing, the Los Angeles Chamber of Commerce warns pur chasers of orange lands to buy no property without seeing it person ally, no matter what representations are made regarding it, nor b whom.

A real estate man may be perfectly honest in thinking land goo for oranges, but he may have taken somebody's else word for it, an not have looked into the matter carefully himself. The intendin purchaser is the party most interested, and he should himself loo thoroughly into the situation:—lay of the land; soil, climatic cond tions (whether reasonably free from frost), and water supply.

In addition to the honest dealer who is liable to error, there ar unhappily in Southern California, as well as elsewhere, unscrupulou men who will do anything to turn a dollar.

The Chamber of Commerce is beseiged with questions regardin the reliability of real estate agents. It is not within its province t pass on such questions, as this would necessitate a separate depar ment, leading the organization into the field of the mercantile agencie

There are plenty of trustworthy real estate men in California, an the seeker after land, if he be at all a judge of human nature, shoul be able to determine whether or not a dealer is reliable when he come into contact with him.

The Chamber of Commerce says to all intending purchasers: dea in person with the agent or owner, look at the land, study the valu of its location, and know what you are getting before you buy.